DOCUMENT RESUME

ED 112 751 HE 006 735

AUTHOR Cohen, Eugene E.
TITLE A Philosophy of Computer Utilization in Higher Education.
INSTITUTION National Association of Coll. and Univ. Business Officers, Washington, D.C.
PUB DATE Oct 72
NOTE 5p.
AVAILABLE FROM National Association of College and University Business Officers, One Dupont Circle, Washington, D.C. 20036
JOURNAL CIT Studies in Management; v2 n3 Oct 1972

EDRS PRICE MF-$0.76 Plus Postage. HC Not Available from EDRS.
DESCRIPTORS Automation; *Computer Programs; Data Bases; Decision Making; Educational Administration; *Electronic Data Processing; *Higher Education; Information Science; *Information Systems; *Management Systems; Programing

ABSTRACT

The requisites for the development of sophisticated and meaningful information systems being applied in varying degrees in universities and colleges are discussed. It is suggested that a philosophy that provides for an adequate, reasonable amount of computer power for administrative use is mandatory, and that users should not be slaves to the computer. In planning computerized administrative systems, the users must actively participate to insure the validity of the systems in meeting their particular information needs in a manner that insures informational integrity. Suggestions are made for educating staff at all levels concerning computer problems, allocations, costs, and time, and for exchanging tested systems with other colleges and universities. (LBH)

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THE COLLEGE and UNIVERSITY BUSINESS OFFICER
STUDIES IN MANAGEMENT
October 1972

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Systems and Budgeting

A PHILOSOPHY OF COMPUTER UTILIZATION IN HIGHER EDUCATION

By Eugene E. Cohen

The paper below was presented by Mr. Cohen at the 1972 NACUBO Annual Meeting in Denver.

RATHER THAN DEAL with the more technical aspects of computer utilization, I will attempt to present what I believe to be the necessary requisites for the development of those sophisticated and meaningful information systems which are being applied in varying degrees in universities and colleges throughout the country. Being situated in the center of the action, my intention is to present a perspective which may well be of use on your own campus. This perspective is related not only to my campus experiences, of which there have been many, but also to observations made in visiting numerous other institutions as a site visitor for various accreditation and granting agencies.

With regard to overall computer utilization, it is mandatory that there be a philosophy which provides for an adequate, reasonable amount of computer power for administrative use. All areas of the campus must be cognizant of and support this philosophy. To do otherwise only invites chaos. In the complicated world of today, it is no longer possible to isolate administrative data processing without concern and consideration for *all* the users throughout the campus.

If the prevailing philosophy at your college or university is to provide a computer installation for administrative data processing requirements, and if that philosophy incorporates a strong desire to use the computer for the development of a management information system, then you have crossed your first hurdle in creating a successful management computer installation.

The communication to your associates of an institutional use of the computer for effective complementary utilization based on sound philosophy and goals is the best guarantee that the computer hardware will work for you in a meaningful manner.

On our campus, the computer, for all purposes (it is our only major computer), is under the administration of the Financial Affairs Division. We do have a Scientific Director (a Ph.D.) who relates computer requirements and interpretations to the teaching and research community. Because the computer is located in the Financial Affairs Division (and to make absolutely sure that we are not charged with giving priority to accounting and business requirements to the detriment of the registrar, admissions and other kinds of administrative computing requirements), we have established a committee known as A.S.P.R.B., the Administrative Systems Planning and Review Board. A.S.P.R.B., with representatives from each of the university's major divisions, has the responsibility for analyzing the computer needs of the various users within the university and recommending priorities in which new requests are processed. A.S.P.R.B. has worked effectively and has given reasonable assurance that appropriate attention has been given to the total administrative computer utilization needs of the university.

Another philosophical point of prime importance is that users should not be slaves to the computer. To the contrary, the computer must be their slave. In the planning of computerized administrative systems the users must actively participate to insure the validity of the systems in meeting their particular information needs in a manner which insures informational integrity. Implementation and operational participation on the part of the users is also required to review results, provide correctional guidance, and insure adherence to established control procedures.

In order to establish a means of extracting requirements from our various administrative areas so that the requirements can be understood and effectively evaluated, we have devised a system which we call U.S.E.R., the University System for Essential Reports.

U.S.E.R. requires the person requesting services from the computer *to think*. It forces him to organize his

Eugene E. Cohen *is Vice President for Financial Affairs and Treasurer of the University of Miami, Florida. Since 1948 he has served the University as Budget Director, Controller, Business Manager, and Treasurer as well as Professor of Accounting. A consultant and director of a number of organizations, Mr. Cohen received his BBA and MBA from the University of Miami and pursued advanced study at the University of North Carolina and Wayne State University.*

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VOLUME 2, Number 3
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thoughts so that when he has completed his preparation of the U.S.E.R. request, he has accurately evaluated his requirements, eliminated the extraneous, organized his thinking, and developed a presentation which can be effectively communicated to the systems and programming personnel.

Because the problems of effective communication are so acute and the investments in time and machines so great, we also have a member of our Financial Affairs team, a competent Certified Public Accountant, who acts as "interpreter" between the various accounting-oriented departments and the computer personnel. We have found his efforts to be invaluable in facilitating the development of systems for the Financial Affairs Division of the university.

If your philosophy is well established and your total university community supports the concept of administrative data processing, then the application of U.S.E.R., I believe, prepares you for effective utilization of your computer facilities.

Users Must Be Educated

Few of us, if any, have invested sufficient resources in developing educational programs for users. If we do, users will become aware of the capabilities of computers as well as what is really involved in developing programs from concept to completion. Too, the users should be made aware that completed systems and programs must not only provide the needed information, but also must have the information dovetail with other systems and programs which have been or will be developed. Many department heads, principal investigators, as well as vice presidents and presidents, believe that once you have a gigantic hardware installation, programming needs are relatively simple things. They do not understand that, in a complex university, just the cost of developing a major program could represent a six-figure investment.

A common malady is to see users completely at the mercy of the computer "expert" who dictates usage and direction. This occurrence is unhealthy and can lead to disaster. If we say that we do not have time to become educated in the basic concepts of computer processing and technology, we are asking for difficulties. All of us must find time to develop a rudimentary knowledge of our computer installation or we will spend a greater amount of time trying to unravel some of the problems that slip by during the systems, planning and implementation stages.

Education in computers should extend to all levels of workers, not just to management. Those employees who utilize computer-generated information and who mesh with the computer operation, will perform much more efficiently if they know something about what is really happening. An ongoing education program involving computer concepts and principles is extremely desirable. While this education takes time, and time is money, there is no substitute for quality for any program on our campuses. Poor system design and inefficient computer usage may well cost more than the released time and the purchase of a few educational materials. Your computer vendors have good executive and management level courses in computing which are intended to both introduce the user to the basics of computing, and to give the user a taste of the technique involved in making computers work. Knowledge of this nature helps protect both the executive from the computer technician and the technician from an unknowing manager. These courses can be used as models for spin-offs of courses for a wider range of personnel. Your own computer professionals should be able to provide you with this internal education so as to extend your knowledge of principles, capabilities and limitations.

It is fair to say that many of us have more computing power on our campuses for administrative data processing than we can use. In some cases, we are the customers of the academic and scientific community on our campuses. In others, we actually may be buying our computing requirements off campus, either from another institution or from a service center. In a few instances, the administrative area head may even be the manager of the campus computing facility. Probably the most common situation on most campuses finds a multiplicity of computers placed in various disciplinary areas, geographic locations, or points of power and demand.

Have we not invested an excess amount of our available funds in computing hardware and not enough in software? It is the sophisticated software that is sorely needed in order to move forward with the complex systems that we require to meet the demands of our constituencies.

Hardware, Software, Humanware

Of equal, if not more, importance than the hardware and the software are the people who work with your computer installation.

I have seen all levels of administrative data processing—none of which is perfect. I have yet to witness a truly "total management information system"—whatever that is. I have seen shoestring operations with effective input which are far more productive than some campus efforts which represent a million dollar investment in design and programming. The difference is obvious. It is the people, the human side of computer installations.

We have discussed the organization of a plan for computer action. We must also make an honest and objective evaluation of our computer personnel. Are your manager and his lead people products of the old machine accounting era? If so, are they capable of changing to the computer mode of the 70's? You are dealing with an area of responsibility of major consequence and whether you can afford less than the highest quality of leadership here is

certainly questionable. Decisions need to be made by people. Full cooperation and a comprehension of capabilities and complexities must be generated at all levels if the "black box" is going to be productive. Without a strong management team, supported by fair-minded and competent people at the user and administrative levels, there cannot be an effective design for computer utilization.

After acquiring sufficient hardware, establishing internal priorities and securing a competent staff, you are ready to concern yourself with the broad problem of computer utilization. You have now come to the area where I wish to express my most concern. Our manufacturers, in most cases, have been able to provide us with efficient computers with tremendous speeds and capabilities. I believe computer salesmen have done an effective job of selling us competent hardware to do the tasks that need to be done on our campuses. What I believe our computer friends have not done, however, is to provide us with the *software* that is critically necessary for us to do our work in an environment of efficiency.

Because of this situation, the rather costly process of "re-inventing the wheel" has been the common thrust on most campuses as administrative computer programming has been attempted. I voice concern and frustration that we in the university community have not been able to develop an exchange of well-documented programs which can (1) significantly reduce the cost of developing such programs and (2) greatly reduce the timeframe and thus allow us to all move forward much more rapidly in the development of major computer applications.

I heartily commend the College and University Systems Exchange (CAUSE), the new organization in this area, which is in the process of establishing a computer program exchange along with other services of which most of you are aware. Needless to say, the availability of a good exchange facility holds great promise for many of us. We recently received an excellent well-documented program from another university and we believe we have saved approximately seventy percent of the time that would have been required to develop the program from scratch. Our dollar savings are estimated at sixty percent. These are significant figures and illustrate what can be done when our exchanges become more commonplace. On our campus, we have well-documented programs for several areas of interest but we are still a long way from having an efficient total system. We are anxious and willing to exchange fully-documented programs. In spite of many differences, most colleges and universities have a basic commonality of procedures and activities. All of us are concerned with payroll, student receivables, workorders, accounts receivable, and registration, just to name a few programs. It seems incongruous that on many campuses systems analysts and programmers are in the throes of organizing completely independent and brand new payroll systems. Certainly effective and adaptable payroll systems, as well as many other systems, have been developed already on other campuses.

Who Manages Management Systems?

The concept of management information systems has been beset by grave problems in recent years. Technicians have taken over many management decisions simply because management has been unable to equip itself with enough understanding of the systems that it was, and still is, supposed to manage.

Increasingly, computer users are finding that their great plans for management information have turned into costly over-runs, missed deadlines and snarls of excuses. The reason for these poor results, which has become readily apparent, has not been technical failures. Management failures have been the cause. Management—particularly top administration that does not possess a reasonable understanding of computer principles—has been swamped in a maze of technical jargon and grand promises that have clouded many vital issues that should have been considered. To fully exploit the benefits of computers, management must have the opportunity to evaluate and select the best possible applications. Unfortunately, proposed programs or political situations often receive the higher priorities.

Since computer systems are simply ideas in action, people are the most important factor in obtaining a good system of management information. It is no secret that ideas come from people who are motivated to think and then to act. Transforming motivation into user systems requires exceedingly well-honed cooperation between line operations and the technical skills of the computer specialists. Computer projects must justify their existence by competing with other university needs, such as security and microscopes. They must prove their worth by meeting basic university goals. Cost justification is no longer limited to profit-making enterprises.

Lump Sum Budgeting

A particular area of computer utilization which has proven quite effective on our campus deals with an approach to budgeting which has saved considerable time for senior administration, relieved many of the ill feelings which had developed in the preparation of departmental budgets, eliminated the necessity of redrafting the budget two, three or four times and has, possibly most important of all, developed a team of competent managers down to the departmental level. In so doing, we have made the department chairman, often in industrial terminology referred to as a "middle level manager," into an effective and efficient chairman who has a feel for the university budget, a concern about results, and an accepted re-

sponsibility to utilize in the most effective manner the university's resources made available to him. We call our technique (it is not unique) the "lump sum technique for budget preparation."

Briefly, we approach budget preparation by balancing anticipated income to proposed allotments for expenditures in advance of budget preparation by deans and department chairmen. Once the estimated income for the next fiscal year has been determined, we identify the general and fixed expenditures for the university. In our terminology, these include such items as employer Social Security contributions, debt retirement, insurance, utility cost increases and other fixed charges. In another step, the anticipated income/expense relationship is estimated for each activity where there is such a relationship. These activities include the auxiliary operations and residence halls, food service and student union, the intercollegiate athletics program, and numerous organized activities. University support is determined for each activity and funding increased or decreased accordingly.

Once the allocable figure has been determined, the Budget Committee allocates funds to each of the five vice presidential divisions within our university. When a vice president receives his lump sum, the budget of the university is already balanced for the next year. An effective control system assures that each vice president requests no more than the amount which he has been allocated. In all of these programs, we have relied heavily upon our computer. We have drawn from various sources to develop actual information for preceding years. We have used our payroll system to pull together the line-item data needed for our personnel determinations. We have made extensions as approved or necessary for various categories of expenditures. We have used the computer to combine prior data as new systems are evolved; we have dealt with salary splits where part of a person's salary is in a university-supported budget and part is in a restricted or other fund budget; and we have provided preliminary print-outs for our vice presidents and the Budget Committee.

We welcome the opportunity to "defend" our budget, and only with computerization can we effectively provide the kind of answers which are asked of us by our very knowing and interested Board of Trustees. We have spent considerable time utilizing our computer to develop the kinds of data our Trustees expect of us and to effectively utilize this tool for "confidence building."

Summation

In conclusion, I urge you to give serious thought to the development of a campus philosophy for administrative computing, to evolve an efficient system for extracting information from users so that requirements can be efficient and complementary, and to develop a system for fair and efficient use of computer resources. In addition, educate people at all levels concerning computer problems, allocations, costs and time, and make every effort to exchange tested systems with other colleges and universities. Once you are successful in the development at the above steps and techniques, you are ready to begin the arduous task of evolving the business requirements of your university into systems which, when put together, will add up to a management information system. At this time—and few universities, if any, have reached this point—you are on line in a very productive posture and ready to begin to deal with changes which continue to affect the basic system as it was designed.

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